

Combined Sewer Overflow Control

The RWSP calls for continued improvements to control combined sewer overflows (CSOs). The RWSP identifies 21 projects to control King County's CSOs by 2030 to meet the Washington State Department of Ecology (Ecology) standard of no more than an average of one untreated discharge per year at each CSO location.

CSOs are events where untreated wastewater and stormwater from combined sewers discharge directly from outfall pipes into water bodies during heavy rainstorms when sewers are full. Combined sewers, which carry both wastewater and clean stormwater, exist in many parts of older cities across the nation, including Seattle. To protect treatment plants and avoid sewer backups into homes, businesses, and streets, combined sewers in Seattle sometimes overflow at specific locations (CSOs) into Puget Sound, the Duwamish Waterway, Elliott Bay, Lake Union, the Lake Washington Ship Canal, and Lake Washington. Although the wastewater in CSOs is greatly diluted by stormwater, CSOs may be harmful to public health and aquatic life because they can carry chemicals and disease-causing pathogens.

By May 2005, about 17 of King County's 38 CSOs were controlled to Ecology's standard. The remaining 21 uncontrolled CSOs will meet state standards as capital improvement projects are completed between 2012 and 2030. An update and calibration of the hydraulic model, expected to be ready in 2007, will help verify the control status of King County CSOs. More information on the update of the hydraulic model is provided later on in this chapter.¹

Strategies for reducing CSOs include pollution prevention through source control, operational controls, upgrades of existing facilities, and construction of additional facilities to provide storage and treatment of excess flows prior to discharge. The RWSP directs the county to give the highest priority to CSO discharges that have the greatest potential to impact human health, bathing beaches, and/or species listed under the federal Endangered Species Act (ESA). Based on this direction, projects to control CSO discharges along Puget Sound beaches are scheduled to be completed first. The RWSP also directs the county to continue implementation of CSO control projects that were under way prior to adoption of the RWSP.

5.1 Accomplishments in 2005

The key achievements of the CSO control program in 2005 are as follows:

- Completion and startup of Mercer/Elliott West CSO control system (formerly called the Denny Way/Lake Union CSO control project)

¹ The hydraulic model outputs flow depths and velocities in specific pipe segments and allows for the evaluation of system performance under existing and future demands.

- Completion and startup of the Henderson/Norfolk CSO control system (formerly called the Henderson/MLK/Norfolk CSO control project)
- Substantial progress on the CSO control program review
- Continued coordination on CSO and stormwater management for the Alaskan Way Viaduct and Seawall Replacement project
- Continued response to the Environmental Protection Agency's Superfund listing of the Lower Duwamish Waterway
- Moving forward with the sediment management plan (progress on sediment cleanup at the Denny Way outfall structure sites and at the Lander and Hanford CSOs)

5.2 Mercer/Elliott West CSO Control System

The Mercer/Elliott West CSO control project was under way prior to the adoption of the RWSP. This project was a joint effort of King County and the City of Seattle to control CSOs into Lake Union and Elliott Bay. The project was completed in May 2005. The completed system controls several of Seattle's CSOs in addition to the largest CSO in the county's system.

Startup of Mercer/Elliott West system has been complicated because of dry weather flows entering the Mercer Tunnel from Seattle's Lake Union system. These flows have caused operations and maintenance challenges. Investigations indicate that the downstream pipe is two-thirds full of sediments, causing flows from the pipe to back up in the tunnel. Cleaning of the pipes began in May 2006. New flow monitors will be installed to monitor the effects of the pipe cleaning. The project is expected to be fully operational in late 2006.

5.3 Henderson/Norfolk CSO Control System

The Henderson/Norfolk CSO control project was under way prior to the adoption of the RWSP. The project was completed in May 2005. This completed system controls two CSOs in Lake Washington and one CSO on the Duwamish River at Norfolk. With completion of this project, all of the county's CSOs along Lake Washington are controlled.

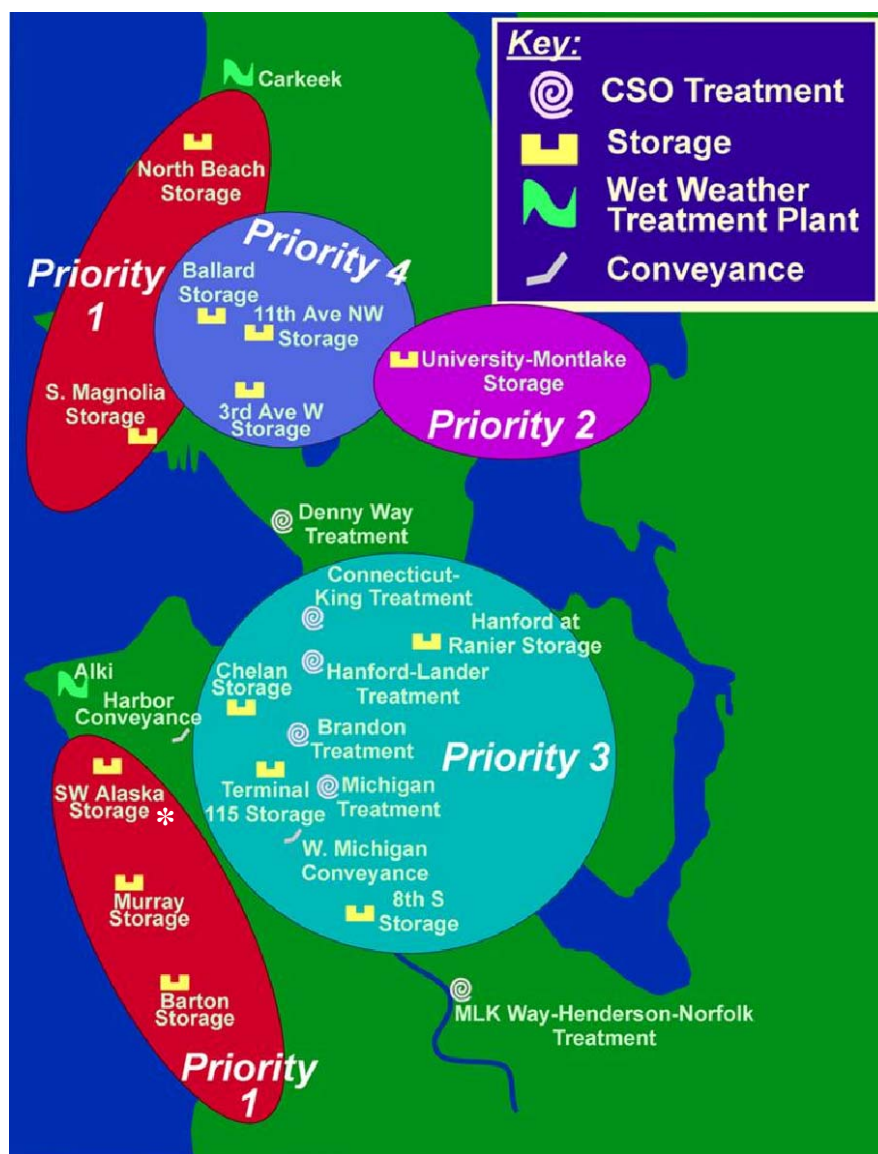
5.4 CSO Control Program Review

In accordance with the RWSP CSO control policies, the Wastewater Treatment Division (WTD) carried out a CSO control program review to evaluate the benefits of continuing the CSO control program as identified in the RWSP. The CSO control program review was completed and transmitted to the Metropolitan King County Council in spring 2006.

The review assessed whether adjustments in the CSO control program were needed to respond to changing conditions, ongoing regulatory requirements, and county business needs. Results of the review indicate that current scientific information supports the approach and direction of the

RWSP CSO control program. The review confirmed that the current WTD priority of using conveyance improvements or storage facilities to capture and then transfer CSOs to the secondary plants provides the best CSO control management and that satellite CSO treatment should be used where transfer is not feasible. The review also confirmed that the schedule for completing the CSO control projects meets the RWSP's direction to prioritize projects according to their potential to protect human health, the environment, and endangered species. The project priorities, as shown in Figure 5-1, are as follows:

- **Priority 1, CSOs near Puget Sound Beaches.** The current schedule calls for completion of the Barton, Murray, North Beach, and South Magnolia projects in 2012.
- **Priority 2, University/Montlake CSO.** This CSO is located at the east end of the Ship Canal. The control project was given a high priority because of the high level of boating in that area, which could result in secondary contact with the water. The current schedule calls for completion of this project in 2015.
- **Priority 3, CSOs Along the Duwamish River and in Elliott Bay.** The RWSP designated that nine projects at CSOs along the Duwamish River and in Elliott Bay be completed between 2017 and 2027. These projects were given third priority because King County's 1998 *Combined Sewer Overflow Water Quality Assessment for the Duwamish River and Elliott Bay* indicated that the level of bacterial pollution originating upstream of CSOs was high enough to dwarf improvements by CSO control projects.
- **Priority 4, CSOs at the West End of the Ship Canal.** Three projects to control CSOs at the west end of the Ship Canal (Ballard, 3rd Avenue West, and 11th Avenue West) are scheduled to be completed by 2030. These are the last projects to be completed because significant CSO control had already been accomplished in this area prior to the adoption of the RWSP.



* The SW Alaska Storage project is no longer needed; updated monitoring and modeling data indicate that this CSO is already controlled.

Figure 5-1. Prioritized CSO RWSP projects

The four CSO control projects along Puget Sound beaches—Murray and Barton in Alki, Magnolia along north Elliott Bay, and North Beach near Carkeek Park—will enter predesign in mid-2006. Low-interest state loans have been awarded to develop facility plans for three of these projects.

WTD will continue to monitor the information that is being generated through the Lower Duwamish Waterway Superfund project for factors that could lead to recommending future schedule changes to CSO control projects. For example, if an ongoing human health risk in the Duwamish River is identified as resulting from CSOs, recommendations for changes in the schedule may be considered to accelerate the CSO control projects in these locations.

The review also identified advances in CSO treatment technologies that could lead to more cost-effective facilities. Pilot testing of these technologies will be conducted in late 2006 through 2009. In addition, the review determined the need to update and recalibrate the hydraulic model used to predict the effectiveness and design of CSO control projects. The updated model is expected to be complete in 2007 and will be used to re-evaluate project needs and sizing. The next CSO program review, scheduled for 2010, will include information on the results of the updated model and the testing of technologies, as well as updated cost estimates for the CSO control program projects.

The CSO control program review is available on the Web at <http://dnr.metrokc.gov/wtd/cso/library.htm#plans>

5.5 Coordination on the Alaskan Way Viaduct and Seawall Replacement Project

Discussions continued with the City of Seattle and Washington State Department of Transportation (WSDOT) on CSO and stormwater management for the Alaskan Way Viaduct and Seawall Replacement project. The county provided significant technical input and review to the city's drainage and wastewater feasibility study (August 2005). The feasibility study found that the city's CSOs along the Elliott Bay waterfront were not controlled as had been assumed during development of the RWSP. The county, city, and WSDOT continue to work on solutions for future stormwater and CSO management in this area.

5.6 Lower Duwamish Waterway Superfund Site

King County continues to work to improve water quality in the Lower Duwamish Waterway through actions such as reducing CSOs, restoring habitats, capping and cleaning up sediments, and controlling toxicants from industries and stormwater runoff. WTD is partnering in an agreement known as the Lower Duwamish Waterway Group (LDWG) with the City of Seattle, the Port of Seattle, and the Boeing Company under a consent agreement with the U.S. Environmental Protection Agency (EPA) and Ecology to prepare a remedial investigation and feasibility study for the Lower Duwamish Waterway Superfund Site. The agreement gives WTD the opportunity to shape the process and to implement any cleanups earlier than would have occurred under a traditional Superfund approach.

The field studies needed to complete the remedial investigation have been completed. Work is starting on the feasibility study, which will outline alternatives for the final cleanup of the site. Extensive public outreach activities are being carried out to ensure that local communities and other stakeholders are informed of the progress on the site and to provide them with opportunities for involvement in the development of the program.

The LDWG is committed to undertaking four of the early action sites, which will clean up portions of the waterway years earlier than required. The county is participating in two of the early action sites at Diagonal/Duwamish CSO/Storm Drain and Slip 4.² The cleanup of 60,000 cubic yards of contaminated sediment over a 7-acre area of river bottom at Diagonal/Duwamish was successfully completed in February 2004. The dredged area was capped with 3 to 6 feet of clean sediment and gravel to provide new fish habitat, helping to restore a vital area of the river environment. Follow-up work was completed at the site in February 2005, and monitoring of these actions will provide critical information on cleanup alternatives for the Superfund site. The Diagonal/Duwamish remediation closure report issued in July 2005 summarizes the purpose for and details of the follow-up work. The closure report is available on the Web at <http://dnr.metrokc.gov/wtd/duwamish/diagonal.htm>. Monitoring on the new cap in 2005 showed accumulations of phthalates and other chemicals in front of the Diagonal/Duwamish outfall. This discovery has led to discussions with EPA, Ecology, and the Cities of Seattle and Tacoma about how to address ubiquitous runoff contaminants, including the formation of a special phthalate workgroup.

In spring 2006, EPA selected a cleanup plan for Slip 4 sediments. Sediments with the highest contamination will be removed, and the remaining sediments will be capped. The cleanup is scheduled to begin in October 2007.

WTD worked with the City of Seattle and Port of Seattle to secure a state grant for the portion of this work done in the 2003–2005 biennium and has been awarded a new grant for the 2005–2007 biennium. To date, 50 percent of the county's cost on the remedial investigation/feasibility study and the Slip 4 cleanup has been covered by these grants. WTD also applied for and was notified that it is eligible for a retroactive grant for the cleanup of contaminated sediments at Diagonal/Duwamish and two other sites conducted as part of the Elliott Bay/Duwamish Restoration Program.³ Grant award will be made in the next biennium (2007–2009) based on availability of dedicated funds.

Visit the Duwamish Waterway Programs Web site for more information:

<http://dnr.metrokc.gov/wtd/duwamish/#sediment>

5.7 Sediment Management Program

The RWSP policies call for the development of a long-range sediment management strategy to prioritize cleanup of contaminated sediments at specific CSO locations. WTD is carrying out a sediment management plan developed in the late 1990s to remediate sediment near some county CSO outfalls that are contaminated with a variety of heavy metals (lead, copper, zinc),

² Slip 4 is located approximately 3 miles upstream from Harbor Island, just north of Boeing Plant 2. The slip encompasses 6.4 acres and is approximately 1,400 feet long with an average width of 200 feet. The northwest side of the slip is mostly covered with docks and a berthing area.

³ The Elliott Bay/Duwamish Restoration Program (EBDRP) was established to implement the requirements of the 1991 Consent Decree defining the terms of a natural resources damage agreement. The goals of the EBDRP include remediation of contaminated sediments associated with King County and Seattle CSOs and storm drains, restoration of habitat in Elliott Bay and the Duwamish River, and control of potential sources of contaminants from the outfalls.

phthalates, polychlorinated biphenyls (PCBs), and hydrocarbons. Most of the contamination is from the first half of the 20th century.

King County is responsible for cleaning up sediment contamination related to CSOs under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the state Model Toxics Control Act (MTCA).⁴ The county is working to meet the following objectives:

- Remediate sediments in a timely, efficient, and economical manner
- Prevent harm to public health
- Limit future liability

King County has begun work on the first of the cleanup sites—in front of the old Denny Way outfall structure. This three-year project will clean up the remaining contaminated sediment in the nearshore area adjacent to the outfall. Cleanup is also under way at the Lander and Hanford CSOs. Dredging at Hanford is complete, but EPA has determined that a remedial investigation/feasibility study (RI/FS) is warranted to determine additional cleanup needs in the East Waterway. The work associated with the RI/FS is a continuation of the Harbor Island Superfund cleanup begun in the 1990s. WTD has negotiated an agreement with the Port of Seattle and the City of Seattle to conduct these studies and pursue other parties that might have contributed to the contamination.

5.8 Schedule for 2006

5.8.1 CSO Control Program

The CSO control program review was transmitted to the King County Council and the Regional Water Quality Committee in spring 2006. Predesign will begin in 2006 on the four Puget Sound beach CSO control projects. Update of the hydraulic model will continue in 2006 and will be completed in 2007; the testing of new technologies will take place in 2007 to 2009. Coordination with the City of Seattle will continue on CSO control planning projects, including discussions about sewer system needs associated with the Alaskan Way Viaduct and Seawall Replacement project.

Visit the CSO control program Web site for more information: <http://dnr.metrokc.gov/wtd/cso/>

5.8.2 Lower Duwamish Waterway Superfund Site

In 2006, work will continue on the remedial investigation for the Lower Duwamish Waterway Superfund site. The draft remedial investigation is scheduled for public review in early 2007. The detailed work plan for the feasibility study for the project is expected to be ready for public review in late 2006. Work will continue on the feasibility study through 2007. Cleanups at two of

⁴ CERCLA is commonly known as Superfund.

the early action sites are currently scheduled to begin in late 2007. Post-remediation monitoring will continue at Diagonal/Duwamish cleanup site. Ecology, WTD, and the Cities of Seattle and Tacoma are forming a workgroup to determine appropriate actions and strategies to address runoff problems for ubiquitous contaminants like phthalates. Visit the Duwamish Waterway Programs Web site for more information: <http://dnr.metrokc.gov/WTD/duwamish/>

5.8.3 Sediment Management Program

Dredging at the old Denny Way outfall site is scheduled to begin in late 2007. The schedule and process for the remedial investigation/feasibility study on the East Waterway of the Duwamish River will be determined in 2006. Allocations for formal cost shares for the cleanups at Slip 4 and Hanford will be set during 2006. WTD is also starting negotiations to conduct a cooperative cleanup at King Street CSO as part of WSDOT's Colman Dock upgrade project.

Visit the Sediment Management Program Web site for more information:
<http://dnr.metrokc.gov/wtd/sediment/>